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PHOTOGRAPHIC MANUALS, No. I.

PLAIN DIRECTIONS

FOR OBTAINING

PHOTOGRAPHIC PICTURES

BY THE

CALOTYPE AND ENERGIATYPE

PROCESSES.

PRICE SIXPENCE.

Croucher, J. H.

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THE OREGONIAN

PHOTOGRAPHIC

FOR

PHOTOGRAPHIC

IN

OF PHOTOGRAPHY

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OBTAINING PHOTOGRAPHIC PICTURES BY THE CALOTYPE AND ENERGIATYPE PROCESSES.

THE art of Photography, by which, through the agency of light, the most accurate and beautiful representations of objects are obtained, is the fruit of modern science and research. The darkening of nitrate of silver, under the rays of the sun, had been long known; but no attempt was made to apply this fact to the purposes of the arts till 1802, when Mr. T. Wedgewood published a "Method of Copying Paintings upon Glass, and making Profiles by the Agency of Light upon Nitrate of Silver." Not having been able to discover any mode of fixing the images so obtained, he soon abandoned the enquiry; and little or nothing was heard of the subject, till Mr. Henry Fox Talbot made known the result of his experiments, in a paper read before the Royal Society, in January, 1839, which he followed up by another in the succeeding month, detailing his method of preparing a paper for photographic purposes, and of fixing the designs. This paper was not, however, sufficiently sensitive to be used in the camera-obscura. Some few months afterwards, Monsieur Daguerre introduced to the world the beautiful invention, called after him, the Daguerreotype; in which, the images of objects are received upon prepared silver plates, and developed by the vapour of mercury. Meanwhile, Mr. Talbot, continuing his experiments, found means to increase the sensibility of his paper; and in 1841, patented the process, to which he has given the name of CALOTYPE, but which has recently (in accordance with the fashionable photographic nomenclature) been termed the

TALBOTYPE. Many other distinguished scientific men have devoted their attention to this subject, and various processes on paper have been from time to time announced, under the names of Crysotype, Chromotype, Cyanotype, Ferro-cyanotype, etc. For the most useful of these, we are indebted to Sir John Herschel and Mr. Robert Hunt; the latter of whom has lately introduced a very simple and effective method of obtaining Photographic pictures, which he calls the **ENERGIATYPE**. It does not fall within the intention of this little work to describe all these processes at length. The Daguerreotype, from its peculiarity and importance, well demands a separate consideration; besides which, the process is totally dissimilar from those on paper, and much more expensive. Excluding, therefore, all reference to it, and without touching upon the less popular modes of photogenic drawing, the following pages will be devoted to such plain explanations of the Calotype and Energiatype processes, as will enable the amateur to obtain the most successful results.

Before entering on these processes, however, it will be desirable to notice the apparatus which the amateur will require in commencing his photographic operations. Where camera pictures are not desired, these will be few and easily obtained. Some camel's-hair brushes, one or two quires of good writing paper, and a few sheets of blotting-paper, are indispensable. The brushes should be large, but must by no means be bound in tin. The most suitable writing paper is either Whatman's or Turner's superfine yellow or blue wove, or Moinier's pure white paper. Every sheet must be examined by a strong light, and all those rejected which have any kind of spot upon them. One side of the sheet should have some kind of pencil mark on it, by which it may be recognized. The blotting paper should be the white wove. A trough of Berlin ware, the glaze of which is not acted upon by chemical preparations, is also requisite for preparing and washing the paper. The best copying apparatus is a box of hard wood, into which a piece of plate glass and a board covered with flannel are fitted, which are pressed close together by a small screw.

The camera obscura adapted for photographic purposes, is a very superior instrument to that commonly sold under this name. The lens is either achromatic or a miniscus. By some the latter is preferred. Mr. Cundell, whose contributions

to the art are very valuable, has recently recommended the employment of two miniscus lenses of twenty-four inches focus, and three inches in diameter, to be placed seven inches apart, their conjugate foci being as that of a single lens of thirteen inches, and with an aperture of 1.3 inch, giving a picture beautifully defined. The focus is adjusted either by a sliding tube, in which the lens is placed, or by one part of the camera sliding into the other. A frame holding a piece of ground glass is used to ascertain the focus, and slides into the back of the camera, from which it can be withdrawn and replaced by another frame, in which is a piece of slate or iron for holding the prepared paper, protected from the light by a shutter in front removeable at pleasure.

All the apparatus may be purchased at moderate prices at the opticians, but particular care should be taken in the selection of the camera, upon the accurate construction of which very much depends.

THE CALOTYPE.

PREPARATION OF THE IODIZED PAPER.

Having chosen paper of a close and even texture, and of smooth surface, and marked it on one side in pencil, wash this side over carefully by a large and soft camel's-hair brush, with a solution of one hundred grains *nitrate silver*, in six ounces of distilled water. Cautiously dry it in the dark, and then immerse for a few minutes in a solution of *iodide potassium*, consisting of five hundred grains to one pint of distilled water. The paper when taken out is dipped in water, and either dried by blotting paper, with a gentle heat; or dried spontaneously after it comes from the blotting paper. It must be prepared by candle-light, and is called *iodized paper*. When dried, it is not affected by light, and will keep for any time without spoiling.

Many alterations have been suggested by various individuals, in the formula for making this paper. Of these, we shall only quote that of Mr. Cundell, whose ample and explicit directions, published in the *Philosophical Magazine*, we have taken the liberty of condensing.

Use thirty grains of *nitrate silver*, in one ounce of distilled water, which apply plentifully with a brush, thoroughly wetting every part, but leaving no moisture unabsorbed; this should be done on a hard, smooth board, and thoroughly dried in the dark. Then take a solution of two hundred grains of *iodide potassium*, in half a pint of water, to which fifty grains of salt have been added,—draw the paper over the surface of the liquid, letting it repose upon it,—when plastic,—for a few seconds, never more than one minute. After dipping, lay it flat till about half dry, then set it afloat in clean water for five or ten minutes, drawing it now and then along the surface; do not blot it, but hang it in the air to dry; when dry, smooth it by pressure. This is a very excellent paper, but exceedingly troublesome to prepare. Very good iodized paper is sold by some of the opticians and chemists.

APPLICATION OF THE GALLO-NITRATE OF SILVER.

When the iodized paper is required for use, wash the prepared side, which may always be recognized by its pale yellow colour, with the following preparation;—one hundred grains of nitrate silver being dissolved in two ounces of water, to which one-sixth of its volume of strong acetic acid (very pure) has been added; a small quantity of crystalized *gallic acid* is also dissolved in distilled water, and the two solutions are mixed together, in equal proportions, and in such quantity as is required for immediate use—it will not keep long. When the paper has laid about half a minute, to absorb the *gallo-nitrate of silver*, it must be dipped in clean water, and lightly dried by blotting paper. It may now be placed on the slate or iron back of the camera frame, to which the moisture will make it adhere sufficiently, and is what Mr. Talbot calls Calotype Paper. Mr. Cundell recommends that the mixture should be poured out on a clean slab of glass, and the paper passed over it, being pressed down, so that it may imbibe it equally—left not more than five or ten seconds—and then lightly dried between blotting paper. The whole of the operations, with the gallo-nitrate, must be conducted by the light of a taper, in a room from which daylight is perfectly excluded. To save time, the gallic acid solution may be applied previously, and the paper kept thus half prepared.

PLACING IN THE CAMERA.

The camera having been put in the proper position, directed towards the object to be copied, and a good clear focus obtained, in the manner before directed; the paper is placed wet in the frame made to receive it, the shutter carefully closed, and the frame placed in the camera; the time of exposure here, depends upon many circumstances,—the strength of the light, the colour of the object, the description of lens, used in the camera. With a single achromatic lens in the morning sunshine, from forty to sixty seconds is requisite for a building, and from one to two minutes for a portrait. Pictures have, however, been taken in a much shorter time than this, in fifteen to twenty seconds, by using a combination of lenses, or with a single lens under very favourable circumstances. The best position for taking a building, is at a distance about twice the measure of its greatest dimension, and from an elevation of about one-third of its height. Where some parts of the building are nearer than others, place the focus to that part which it is most desirable to have clear, and neglect the others. It is not advisable to take new and old buildings in the same picture, as the time necessary for the old will over-do the new. The sky is frequently overdone, which may be prevented by interposing a black-screen upon the glass over that part which corresponds to it, and which may be previously ascertained by reference to the ground-glass. Portraits should be taken in the open air, but not in the sun. The best uniform back-ground is a blanket, but figures may be grouped in front of a house, or a mass of foliage. There should not be too much white in the dress, as it will be solarized, or blotched, before the other parts are distinctly portrayed.

When the paper is removed from the frame, always in the dark, nothing is visible; it must then be again washed over with the gallo-nitrate of silver, and exposed to a radiated heat, from a gentle fire, or bottle of hot water;* or, as Mr. Cundell recommends, a jet of steam, holding the paper vertically before it, when the picture will speedily appear.

Having become sufficiently distinct, the picture must be carefully washed and dried: Mr. Cundell says, in water as warm as the finger can bear, which water must be changed once or twice; and then dried in blotting paper.

* A convenient apparatus is sold at the shops for this purpose.

FIXING PROCESS.

The original direction for fixing these pictures was to immerse them in a solution of *bromide* of potassium, one hundred grains, in eight or ten ounces of water; and after leaving them for two or three minutes, finally to wash and dry them.

Mr. Cundell's plan is to soak the picture two or three minutes, or longer, if strongly developed, in a solution of half an ounce of hyposulphite of soda to a pint of water, turning it occasionally,—then to soak it in water, from twelve to twenty-four hours, according to the thickness of the paper, and dry it. The sweetness of the hyposulphite of silver, which it communicates readily to any quantity of water, affords an excellent means of testing when the picture is freed from its influence. It should be washed till the water is perfectly tasteless.

Mr. Fox Talbot has recently published a method of removing the yellowish tint from pictures taken on calotype and other photographic papers prepared by nitrate of silver; by plunging the picture into a bath composed of hyposulphite of soda, dissolved in ten times its weight of water, and heated nearly to the boiling point. The picture should remain in it about ten minutes, and be then washed in warm water and dried. By this means, he says, the picture is rendered more permanent, and the lights whiter. The transparency of calotype pictures may be increased, by causing melted wax to penetrate the pores of the paper. He also states, that photographic pictures may be improved by the following plan:—

“A copy or reversed impression of a photographic picture is taken in the ordinary manner, except that it remains in the light twice the usual time; its shadows are thus rendered too black, and its lights not sufficiently white. It is then washed and plunged into a bath of iodide of potassium (of the strength of five hundred grains to each pint of water) for one or two minutes, which makes the picture brighter, and its lights assume a pale yellow tint. After this it is washed, and immersed in a hot bath of hyposulphite of soda, until the pale yellow tint is removed, and the lights remain quite white. The pictures, thus finished, have a pleasing and peculiar effect of light and shade, which is not easily attainable by other means.”

A calotype paper may be prepared, which may be used

dry, by replacing the usual gallo-nitrate of silver by a solution of twenty-six parts gallic acid, and one part, or thereabouts, of nitrate of silver. This paper may be dried by the fire, but is not so sensitive as the other calotype paper:

POSITIVE PICTURES.

The Calotype process, is intended solely for use with the camera-obscura, and the pictures so obtained are all negative. From these, however, any number of positive pictures may be obtained on paper prepared for the purpose. There are many varieties of these, but those by Mr. Talbot and Mr. Cundell, are the only ones which it is necessary to notice here.*

The first is as follows. Take a sheet of good paper, and having dipped it for a minute or so in a solution of common salt, of one part of saturated solution to eight parts of water, dry it first in blotting paper, and then spontaneously. Wash one of the sides, previously marked, with a solution of nitrate of silver—eighty grains to one ounce of distilled water. Allow it to dry, and it is ready for use.

The formula for Mr. CUNDELL's paper is as follows ;—

To a solution of one drachm of nitrate silver, in twelve drachms of water, add strong ammonia, till the precipitate which falls is just re-dissolved. Wash the marked side of the paper over with this solution, then dip it in water containing forty grains common salt to the pint ; apply the nitrate of silver solution as before, and dry carefully in the dark.

A sheet of either of these papers may be taken and laid with the marked side upward, on a piece of board covered with flannel : on this paper must be laid the negative picture, with its face downwards, and over both a piece of plate glass. The glass and board must be tightly pressed together by screws or weights, and exposed to the light.† In about ten or fifteen minutes of bright sunshine, or in several hours of common daylight, a beautiful positive picture is produced, in which the lights and shadows are corrected. These pictures have a fine effect, though they lose somewhat of their sharpness in passing through the copy. They may be set with hyposulphite of soda, as directed for the *negative* pictures. If the negative is clear,

* Iodized, Photographic, and Energiatype papers may be obtained, ready prepared, at the opticians and chemists.

† A frame for the purpose may be procured. (See page 4.)

and the shadows dark, a great many copies may be obtained from it. Mr. TALBOT has published a method of obtaining positive pictures by a single process, but it is difficult of execution, and the pictures have the same disadvantages as those of the Daguerreotype, viz. : the positions are reversed, and the copies cannot be multiplied.

COPIES OF PRINTS, FEATHERS, LACE, &c.

These are obtained in the same manner as the positive pictures just described ; and where it is necessary to reverse them afterwards, as in the case of prints, the process must be gone through twice ; that is, a strong negative picture must be first obtained, and then positive copies must be got by printing from it. Beautifully accurate copies of a vast variety of objects may be procured in this way.

Some observations on this subject, which will be found under the head of *ENERGIATYPE*, will perhaps assist the operator.

It may be necessary to remind the reader that the *CALOTYPE* is a patented process. In the two patents obtained by Mr. Fox Talbot, the use of the following processes is claimed as his exclusive right. Some of these claims must, however, be considered invalid, and would possibly affect the value of the entire patents if brought to trial.

The employment of gallic acid, or tincture of galls, in conjunction with solutions of silver, to render prepared paper more perfect. The obtaining portraits from life by photographic means upon paper. The employing Bromides for fixing the images obtained. The transferring pictures from one sort of sensitive paper to another. The employment of boiling solutions of hyposulphites to give increased whiteness to calotype and other photographic pictures ; and the process of waxing, when the picture has been rendered more transparent by these means. The process of warming the paper, during the formation of the image, by placing a warm plate of iron behind it to increase the sensibility. The employment of iodized paper excited or rendered sensitive by a liquid, containing only a small portion of nitrate of silver, and subsequently dried ; so as to preserve its sensitive state. The varying the lights and shadows of a picture by iodide of potassium, and the fixing the picture so changed. The placing a sheet of white or coloured paper behind photographic pictures after having

waxed them. The obtaining enlarged portraits and pictures by throwing a magnified image thereof, by lenses, on Photographic paper. The application of photography to printing, by arranging suitable letters or figures, so as to form pages, and making photographic images thereof. The system or combination of the following several photographic processes into one, whereby permanent and perfect copies of the positive kind are obtained, namely, the formation of the negative copy—the fixing it, so that it shall have the requisite transparency and endure great subsequent exposure to the light—the formation of the positive from the negative copy, and its permanent fixation.

ENERGIATYPE.

The process, which Mr. Hunt has designated the *Energiatype*, is one of the simplest and most convenient modes of obtaining photographic pictures; and the public are much indebted to this gentleman for the prompt and handsome manner in which he communicated his discovery, through the pages of the '*Atheneum*,' from which the following account is taken:—

"While pursuing some investigations, with a view to determine the influence of the solar rays upon precipitation, I have been led to the discovery of a new photographic agent, which can be employed in the preparation of paper, with a facility which no other sensitive process possesses. Being desirous of affording all the information I possibly can to those who are anxious to avail themselves of the advantages offered by photography, I solicit a little space in your columns for the purpose of publishing the particulars of this new process. All the photographic processes with which we are at present acquainted, sufficiently sensitive for the fixation of the images of the camera obscura, require the most careful and precise manipulation; consequently, those who are not accustomed to the niceties of experimental pursuits, are frequently annoyed by failures. The following statement will at once shew the exceeding simplicity of the new discovery.

"Good letter-paper is first washed over with the following solution:—

	DRACHMS
A saturated solution of succinic acid.....	2
Mucilage of gum arabic	0½
Water.....	1½

When the paper is dry, it is washed over once with an argentine solution, consisting of one drachm of nitrate of silver to one ounce of distilled water. The paper is allowed to dry in the dark, and it is fit for use; it can be preserved in a portfolio, and at any time employed in the camera. This paper is a pure white, and it retains its colour, which is a great advantage. At present I find it necessary to expose this prepared paper in the camera obscura for periods, varying with the quantity of sunshine, from two to eight minutes, although from some results which I have obtained, I am satisfied, that by a nice adjustment of the proportions of the materials, a much shorter exposure will suffice. When the paper is removed from the camera, no trace of a picture is visible. We have then to mix together one drachm of a saturated solution of *sulphate of iron*, and two or three drachms of the *mucilage of gum arabic*. A wide flat brush saturated with this solution is now swept over the face of the paper rapidly and evenly. In a few seconds, the dormant images are seen to develop themselves, and with great rapidity a pleasing *negative* photographic picture is produced. The iron solution is to be washed off as soon as the best effect appears, this being done with a soft sponge and clean water. The drawing is then soaked for a short time in water, and may be permanently fixed, by being washed over with ammonia,—or perhaps better with a solution of the hyposulphite of soda, care being taken that the salt is afterwards well washed out of the paper. From the pictures thus produced, any number of others, correct in position and in light and shadow, may be produced, by using the same succinated papers in the ordinary way; from five to ten minutes in sunshine producing the desired effect.

“The advantages which this process possesses over every other, must be, I think, apparent. The papers are prepared in the most simple manner, and may be kept ready by the tourist until required for use; they require no preparation previously to their being placed in the camera, and they can be preserved until a convenient opportunity offers for bringing out the picture, which is done in the most simple manner, with a material which can be anywhere procured.

"Anxious to give the public the advantage of this process during the beautiful weather of the present season, I have not waited to perfect the manipulatory details which are necessary for the production of portraits. It is sufficient, however, to say, that experiment has satisfied me of its applicability for this purpose.

"Prismatic examination has proved, that the rays effecting this chemical change, are those which I have elsewhere shown to be perfectly independent of solar light or heat. I therefore propose to distinguish this process by a name which has a general rather than a particular application. Regarding all photographic phenomena as due to the principle *ENERGIA*, I would, nevertheless, wish to distinguish this very interesting process as the *ENERGIATYPE*.

"I enclose you a few specimens of the results already obtained. The exceeding sensibility of the *Energiatype* is best shown, by an attempt to copy engravings or leaves by it. The three specimens I enclose were produced by an exposure of considerably less than one second."

In a subsequent number of the same Journal, Mr. Hunt subjoins some further details upon the subject. He says—

"In the first place, experience has suggested to me the advantage of adding to the solution of succinic acid and gum, as previously given, five grains of common salt. This preserves the lights very clear, and, indeed, improves the sensibility of the paper.

"When the solution of the sulphate of iron is laid over the paper, it is requisite to keep disturbing it, by rapidly but lightly brushing it up; otherwise numerous little black specks form, which destroy the photograph. If, as sometimes happens, the surface of the picture blackens all over, it must not be concluded that the drawing is destroyed. The whole of this superficial blackness may be removed by immediately washing with a wet sponge. If the lights become in any way discoloured, a little exceedingly diluted hydrochloric (muriatic) acid will restore them to their proper degree of whiteness; but care must be taken that the acid is speedily washed off, or the shadows will suffer.

"When, from the shortness of the exposure, the image develops itself slowly or imperfectly, a slight degree of warmth brings out the picture with rapidity and force. Holding the paper at a short distance from the fire is the best mode of operating.

"With these few additional directions, I believe but very little difficulty will be experienced ; and I am satisfied that a little practice is alone required to render the Energiatype at once the most useful and beautiful of the photographic processes on paper."

The preparation of the paper as above described, is by no means difficult, but requires much care and attention. The solutions must be applied very equally over the paper, which should be immediately hung upon a frame or clothes' horse to dry. Extreme care must be taken that the paper be not exposed to light, after the nitrate of silver solution has been applied, until required for use. Many of the disappointments experienced by the experimenters on the Energiatype are occasioned by a neglect of this precaution ; as, although no apparent effect may have been produced by the exposure, the clearness of the subsequent picture will be seriously injured when the sulphate of iron is applied. The succinic acid must also be very pure. In the general way it will be found more convenient, and perhaps economical, to purchase the paper ready prepared. We shall now briefly describe the method of applying the Energiatype to the different purposes for which it is best adapted, premising that the varying circumstances of time, place, and light will render necessary such modifications of the following directions as the experience of the operator may suggest. As a general rule, an open situation, sunshine, and, if possible, the morning sun, should be preferred, as the image is sharper and the colour produced more intense, and less effected by the subsequent fixing process.

NEGATIVE PICTURES.

IN THE CAMERA.—For a building, an exposure of half a minute in strong sunshine is usually sufficient ; for a portrait, which can only be taken in the shade, one or two minutes is required. Directions for placing the camera, etc., etc., will be found described under the Calotype process, at page 6. Exact copies of prints, feathers, leaves, etc. may be taken, by exposing them to the light in the copying frame, mentioned, page 4, until the margin of the prepared paper, which should be left uncovered, begins to turn slightly. Although no change appear on the part of the paper, which has been covered by the object, the application of the sulphate of iron will develop

the picture. If the object to be copied be thick, the paper must be allowed to assume a darker tint, or the light will not have penetrated it. The sponge used for wiping should be well squeezed; if there be too much water it will soak through the picture and stain the other side. It is better to wash off the solution when it turns very black, and apply fresh until the picture is fully developed, which will prevent the discoloration of the light parts; care must also be taken, that the back of the picture is not touched with the iron solution, which will inevitably destroy its transparency.

POSITIVE PICTURES.

These are procured in the same manner as the copies of the prints, etc., just described; using the negatives before obtained in place of the objects themselves. Instead, however, of using the iron solution, the frame must be exposed to the light a sufficient time to obtain perfect copies. The progress of the picture may be observed by turning up the corner of the paper, and, if not sufficiently done, replacing it exactly in the same position. It is sometimes better to take negative pictures in the same way, without using the iron; in which case, the following observations may be useful.

FEATHERS, if white, or of a light shade, will bear very little exposure; dark feathers may be left until the paper assumes a tolerably deep colour.

LACE.—White Lace, net, work, etc., will not bear much exposure, and must be pressed very close to the paper; black lace, etc., may be exposed much longer.

LEAVES, FLOWERS, etc.—These may be advantageously dried and pressed between blotting paper for a short time before using. They require considerable exposure to produce a perfect copy of the veins and marks: in sunshine from fifteen to twenty minutes,—in ordinary day-light, for three or four hours. These are very beautiful when well executed, and may be coloured to imitate nature very closely.

WINGS OF INSECTS, etc.—These being in general very transparent, must not be exposed too long. When the body

of the insect has been preserved by drying or dissecting, so as to be tolerably transparent, the following method will secure an accurate copy. Take a light image of the whole insect, and then comparing the copy and the original, cut out those parts which are less transparent than the others, and having placed the object on a fresh piece of prepared paper, cover it with the cut paper, so that the dark parts may be first exposed to light. When these are well delineated, remove the upper paper, and leave the whole exposed till every part is sufficiently portrayed. The same plan may be adopted for leaves and flowers, where the parts are of different thicknesses. In copying wreaths of oak or vine leaves, the stem may be replaced by paper cut to imitate it.

ETCHINGS ON GLASS.—By covering a piece of glass with lamp-black and varnish, a subject may be traced on it with a point, which may be copied on the paper.

Pen and ink sketches on paper may be copied in the same manner.

The following modification of the Energiatype process has been proposed, and will be found very useful in cases where the other methods cannot conveniently be applied. A faint image of the object must be obtained on the prepared paper, either in the camera, or in the printing frame, then carefully removing it in the dark, the paper is to be immersed in a spiritous solution of the oil of cassia and cloves, consisting of ten drops of the oil to the drachm of spirit. When the paper is thoroughly permeated with the solution, withdraw it quickly, and place it on a piece of plate glass—the prepared side towards the glass, covering it with several folds of blotting paper, saturated with the same solution; the whole must be kept tightly pressed by a weight. In two or three hours, the image will be well developed, and of a fine colour. They may be set in the usual manner. This plan will enable travellers to take copies of objects, and bring them out without trouble or difficulty. The simplicity and cleanliness of the process, will also recommend it to ladies.

PHOTOGRAPHIC APPARATUS,

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Common Cameras.....	4s.	6d.	7s. 6d. 10s. 6d.
Small Photographic Cameras, with sliding tube, and Periscopic or Plano convex lenses, adapted either for the Daguerrotype, Calotype, or Energiatype processes	1	1	0
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Do. Do. with rackwork adjustment.....	1	15	0
Do. Do. with chemicals, etc.	2	10	0
Do. Do. complete with every requisite	5	5	0
Second size do. with achromatic lens, and sliding tube	1	15	0
Do. Do. with rackwork adjustment	2	2	0
Do. Do. with chemicals	3	16	0
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Willat's Improved Photographic Camera, of the best construction, with variable diaphragm, fine screw adjustment, achromatic lens, capable of taking three various sizes of pictures, either on paper or plates, etc. 3 10 0

"PHOTOGRAPHY.—A Camera on an improved principle, for taking photographic portraits and views, has been invented by Mr. Willats, 98, Cheapside, which, upon examination, will be found much superior to that in ordinary use. We have heard many complaints of the common camera, the insufficiencies of which we think Mr. Willats is in a fair way to remedy. The camera invented by him is of superior value, inasmuch as it can be adjusted with much greater facility and certainty; and so obviates, in a great degree, the trouble often occasioned by the old instrument. We have examined some of the pictures executed by means of the improved camera, and find them most perfect, even to the minutest detail."—*Art Union*, August, 1844.

The above complete in case, with every requisite apparatus and material for the daguerreotype process 10 10 0

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Do. $1\frac{3}{4}$ " 6 " 0 12 0

Do. 2 " 6 " 0 14 0

Parallel Mirrors and Prisms for reversing the Pictures.

Plano Convex, Periscopic, and every description of Lens required in Photographic Experiments.

Brass Camera Fronts, with rackwork adjustment for 1-inch lens, 11s.; $1\frac{1}{4}$ -inch lens, 12s.; $1\frac{1}{2}$ -inch lens, 14s.; $1\frac{3}{4}$ -inch lens, 15s.; 2-inch lens, 18s.

Brass Camera Fronts, with sliding tube for 1-inch lens, 6s. ; 1 $\frac{1}{4}$ -inch lens, 7s. ; 1 $\frac{1}{2}$ -inch lens, 9s. ; 1 $\frac{3}{4}$ -inch lens, 10s. ; 2-inch lens, 12s.			
Frame and glass, with sliding lid, for obtaining positive Photographs, or copying Engravings, Lace, Leaves, etc. etc..... from	0	5	0
Portable Rectangular Frame, for preparing the Sensitive Paper	0	2	0
Folding Tripod Staff, with ball and socket joints, and dove-tail slide for supporting camera, from	1	10	0
Portable Folding Tripod Stand, with Table to fix on top	1	1	0
Common Do. Do. 9s. 6d., 16s.			
Earthenware Trays for washing and setting pictures	0	2	0
Camel's Hair Brushes, 1s., 2s.	0	2	6
Tin Vessels for heating Calotype drawings, 3s. and	0	5	0
Photogenic Paper, in packets 1s. and	0	2	6
Iodized Paper, in packets..... 1s. and	0	2	6
Energiatype Paper, in packets..... 1s. and	0	2	6
Grove's Improved Sensitive Paper.			
Moinier's Pure White Paper.			
Glass Spirit Lamps, each 2s., 3s., and 4s.			
„ Graduated Measures, 1s. 6d., 2s., and	0	2	6
„ Mortars and Pestles.....	0	2	6
„ Stirring Rods.....from	0	0	3
„ Funnelsfrom	0	0	6
Brass Spirit Lamp, with sliding rings..... .from	0	5	0
Scales and Weights, with glass Pans	0	18	0
Patent Plate Glass, for preserving pictures from dust or air, cut to any dimensions.			
White Blotting Paper.....per quire	0	1	6
Paper by Whatman, Turner, and other makers, of superior quality, for Calotype purposes.			
Flat Boards for preparing the Paper.			
Frames and Cases for containing the pictures in great variety.			

		£.	s.	d.
Nitrate Silver	per ounce	0	5	6
Iodide Potassium.....	”	0	2	6
Pure Acetic Acid	”	0	1	6
„ Gallic Acid	”	0	12	0
„ Succinic Acid.....	”	0	10	0
Bromide Potassium.....	”	0	5	0
Pure Chloride Lime	”	0	0	6
Strong Solution Ammonia	”	0	0	4
Proto Sulphate Iron.....	”	0	0	4
Gum Arabic.....	”	0	0	6
Oil of Cloves	”	0	4	0
„ of Cassia	”	0	5	0
Hyposulphite Soda	”	0	0	6
Pure Cyanide Potassium	”	0	2	0
Plates of Glass, Slate, and Iron.				

Back Grounds painted on Canvass for Portrait taking.

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